MICROFUNGI DECOMPOSING ORGANIC REMAINS OF PINES

J. GREMMEN
Forest Research Station, "De Dorschkamp", Wageningen

In this paper a number of fungi are reported, many of which are pioneer colonisers, decomposing the trash of pines, more especially of *Pinus sylvestris*. It is probable that during the process the microclimate plays a selective role. Pine needles rich in carbohydrates are shown to have a mycoflora different from that on needles which are poor in these substances. In the decomposition of the former two subsequent stages may be distinguished depending on the water supply. Short descriptions supplement the key to the species treated.

Many investigations deal with the decomposition of plant debris in the soil, but very little information is available on the decay of organic remains above the ground. Chesters (1950) published a short report on some Ascomycetes associated with the decay of logs and branches of deciduous trees. Another detailed study in this field was contributed by Mangenot (1952). This author, too, investigated the mycoflora of some deciduous trees, listing the fungi which could be isolated from the trunks as well as the fruit-bodies found on them at different times during the year.

GENERAL CONSIDERATIONS.—The annual leaf fall, together with the organic material which remains after the felling of trees in the woods, yields a great quantity of raw material accumulating on the ground. Decomposition of this debris is gradually brought about by many different micro-organisms. The present paper reports on a series of microfungi inhabiting dead pine material which are pioneer colonisers of needles, branches, twigs, cones and even trunks.

The biology of these organisms is still insufficiently known, yet it is of primary interest to know which factors determine their settlement on a substratum. A mycelium e.g. may penetrate a dying branch from an already colonised one. Ascospores are distributed by wind and may reach a suitable substratum over long distances. Pycnospores or conidia are disseminated to a suitable medium by rain drops or insects. The fungus that newly colonised the substratum may prevent another organism from settling on the same medium by means of the secretion of an antibiotic substance.

Colonisation of pine debris may occur in different ways and by various fungi as demonstrated by some examples.

BRANCHES.—Branches of pines dying e.g. from the attack of a parasitic fungus are often inhabited by *Cenangium ferruginosum*. This organism, colonising the twigs when still attached to the trees, seems to be a genuine pioneer. Often the branches are completely colonised with the exclusion of any other organism. In this stage competition by other fungi seems to be impossible, probably because of the dry microclimate of the branches to which the apothecia of *Cenangium* are adapted. The excipulum is very tough and leathery, protecting the hymenium from drying up in a dry period, and uncovering it after a rain shower so as to facilitate the dissemination of the ascospores, until the environmental conditions become unfavourable again. It is this intermittent

activity that goes far to account for the longevity of the apothecium. After shedding of the twigs the microclimatic conditions for the fungus become more humid on account of the close contact with the ground. This causes the competition of other species to increase. Yet the apothecia of *Cenangium ferruginosum* may remain active for some time, ejaculating their ascospores, but other fungi start invading the branches, gradually dissipating *Cenangium*.

After trees have been felled it is common practice for the remaining branches and needles to be used as a fertilizer in the wood. One or two years afterwards a very rich mycoflora develops on this trash. The sudden increase of fungi – especially of Ascomycetes – may be accounted for by the abundance of carbohydrates in the debris, providing an excellent medium for a number of colonising fungi. Many of these are the so-called sugar-fungi, which are especially found on injured, moribund or dead plant tissues. On these cut-down branches many characteristic fungi may be recognized.

Valsa pini seems to be a pioneer too, often covering the branches entirely. Reproduction in this fungus is by means of numerous perithecia as well as pycnidia, the spores of which are present many times a year. *Valsa pini* often predominates on branches lying on the ground where its development seems to be favoured by wet conditions.

Other species to be observed on dead twigs or branches are: *Coryne sarcoides*, *Crumenula pinicola*, *Crumenula sororia*, and *Tympanis hypopodia*.

NEEDLES.—Colonisation of the needles of felled trees is demonstrated by a series of other fungi, viz. *Cenangium acicolum*, *Dasyscyphus pulverulentus*, *Desmazierella acicola*, *Hyalotricha trichodea*, *Ophionectria scolecospora*, *Phacidium lacerum*, *Phialea acuum*, and *Sclerophoma pityophila*. These fungi prefer the needles rich in carbohydrates, those which have naturally fallen down being poor in this substance. Tentatively two successive stages in the decay of these needles may be distinguished, each stage being characterised by certain fungi, depending on the microclimate.

I. *Sclerophoma*-stage.—The needles are grey, lying in heaps under dry conditions or still attached to a succumbed tree, e.g. killed by *Fomes annosus*. Now and then these heaps may be wetted by rain, but they are soon dried out again by wind. Characteristic species: *Cenangium acicolum* and *Sclerophoma pityophila*.

II. *Desmazierella*-stage.—The needles are black, lying in heaps under wet or very wet conditions, almost in contact with or very near the soil. Characteristic species: *Dasyscyphus pulverulentus*, *Desmazierella acicola*, *Phialea acuum*, sometimes accompanied by *Ophionectria scolecospora*. Decomposition in this stage is distinctly more advanced than in the former, and there is no doubt that the *Desmazierella*-stage is the more progressive of the two stages.

In sections the hyphae of *Cenangium acicolum*, *Ophionectria scolecospora*, and *Sclerophoma pityophila* may be observed only to penetrate the chlorenchym of the needles which causes this tissue to shrivel and become brown. The central part of the needle, however, is not invaded by mycelium. The chlorenchym is rich in carbohydrates, whereas the central part is lignified and does not possess sugars. It is almost certain, therefore, that the fungi mentioned break down the carbohydrates, leaving alone the lignin and the cellulose.

The colonisation of naturally fallen needles and of needles shed after infection by a parasitic fungus, e.g. *Lophodermium pinastri*, both of which are poor in sugars, is quite distinct from the colonisation of needles rich in nutrients as mentioned above.

CONES.—Pine cones are also colonised by a number of characteristic microfungi, among which *Gorgoniceps aridula* and *Hyaloscypha hyalina* are regular occupants.

The fact that the species on cones are different from those on needles or branches may perhaps be explained by the difference in chemical composition of the substratum.

CONCLUSION.—In general, decomposition of organic remains in nature seems to happen along the following lines: (*a*) decomposition of the pectic substances; (*b*) decomposition of sugars; (*c*) decomposition of cellulose, and (*d*) decomposition of lignin.

The fungi mentioned in this paper are common inhabitants in the indigenous pine woods. It would be of interest to study the ecology of these organisms, so as to obtain an insight in their behaviour in such a complex biocoenosis as is a pine wood.

The material which has been collected and identified by the author is preserved in his herbarium, whereas most of the species have been isolated in culture for further study.

KEY TO THE SPECIES BEARING APOTHECIA

1a. Apothecia non-phacidiaceous 2
2a. Apothecia hairy 3
3a. Hairs dark brown or red-brown 4
4a. Hairs shorter than 1 mm 5
5a. Hymenium beige . . . . . 4. *Crumenula pinicola*
5b. Hymenium yellowish green . . . . . 5. *Crumenula sororia*
4b. Hairs 1 mm or longer . . . . . 8. *Desmazierella acicola*
3b. Hairs colourless or light brown 6
6a. Hymenium not orange 7
7a. Hymenium white or light brown, hairs without crystals 8
8a. Hymenium white or light brown, hairs pointed 9
9a. Hairs without bulbous base 10
10a. Hymenium white . . . . . 11. *Hyaloscypha stevensonii*
10b. Hymenium light brown, hairs with lumina 12. *Hyalotricha trichodea*
9b. Hymenium white, hairs with bulbous base 10. *Hyaloscypha hyalina*
8b. Hymenium pure white, hairs with globular apex . 19. *Phialea acuum*
7b. Hymenium greenish, hairs with apical crystals 7. *Dasyscyphus pulverulentus*
6b. Hymenium orange . . . . . 6. *Dasyscyphus calyciformis*
2b. Apothecia not hairy 11
11a. Apothecia not violet 12
12a. Primary ascospores only 13
13a. Ascospores needle-shaped 14
14a. Ascospores many-called . . . . . 9. *Gorgoniceps aridula*
14b. Ascospores one-celled . . . . . 13. *Lophodermium pinastri*
13b. Ascospores not needle-shaped 15
15a. Ascospores one-celled 16

16a. Ascospores longer than 10 μ 17
17a. Ascospores ovate . . . . . 2. *Cenangium ferruginosum*
17b. Ascospores ovate-acuminate . 1. *Cenangium acicolum*
16b. Ascospores less than 10 μ long . . . . 17. *Pezizella chionea*
15b. Ascospores one- or more-celled, longer than 20 μ 16. *Pezicula livida*
12b. Both primary and secondary ascospores . . . . . 21. *Tympanis hypopodia*
11b. Apothecia violet . . . . . 3. *Coryne sarcoides*
1b. Apothecia phacidiaceous . . . . . 18. *Phacidium lacerum*

KEY TO THE SPECIES BEARING PERITHECIA OR IMPERFECT FRUCTIFICATIONS

1a. With perithecia 2
2a. Perithecia black 3
3a. Perithecia with long ostiola . . . . . 14. *Melanospora chionea*
3b. Perithecia with short ostiola . . . . . 22. *Valsa pini*
2b. Perithecia orange-red . . . . . 15. *Ophionectria scolecospora*
1b. Without perithecia 4
4a. Conidiophores or basidium-like cells 5
5a. Conidiophores dark brown . . . . . 8. *Desmazierella acicola*
5b. Basidium-like cells with sterigmata . . . . . 3. *Coryne sarcoides*
4b. Pycnidia or similar fructifications 6
6a. Pycnidia not orange-red 7
7a. Spores not finger-shaped 8
8a. Spores one-celled, less than 20 μ long 9
9a. Spores bacilliform 10
10a. Spores 6–8 × 1 μ . . . . . 13. *Lophodermium pinastri*
10b. Spores 2–4 × 1 μ, often curved . . . 21. *Tympanis hypopodia*
9b. Spores different 11
11a. Spores ovate . . . . . 20. *Sclerophoma pityophila*
11b. Spores allantoid . . . . . 22. *Valsa pini*
8b. Spores one- or more-celled, longer than 20 μ . . . . . 16. *Pezicula livida*
7b. Spores finger-shaped, many-celled . . . . . 5. *Crumenula sororia*
6b. Pycnidia orange-red . . . . . 15. *Ophionectria scolecospora*

FUNGI FORMING MICROCONIDIAL FRUCTIFICATIONS

1a. Microconidia globular . . . . . 6. *Dasyscyphus calyciformis*
1b. Microconidia bacilliform . . . . . 16. *Pezicula livida*
see also 13. *Lophodermium pinastri*

1. CENANGIUM ACICOLUM (Fuck.) Rehm *in* Rabenh., Krypt.-Fl., Zweite Aufl. 1 (3): 228, 1896

Apothecia 1–2 mm in diam., sessile or very short-stemmed. Hymenium light brown. Asci 70–100 × 7.5–11 μ. Ascospores 11.5–19 × 4–4.5 μ, colourless, 1- or 2-celled, 1- or 2-guttulate, ellipsoidal-acuminate. Paraphyses colourless, filiform, apices brown, club-shaped.

A very common species, on dead needles of *Pinus* spp.

2. CENANGIUM FERRUGINOSUM Fr. ex Fr., Syst. myc. 2: 187. 1822

Apothecia 1–2 mm in diam., sessile. Hymenium yellowish brown. Asci 80 × 14–15 μ. Ascospores 12–13 × 5–6 μ, colourless, 1-celled, ovate. Paraphyses colourless, filiform, apices somewhat thickened.

Common, on dead branches of *Pinus* spp.

3. CORYNE SARCOIDES (Jacq.) Tul., Sel. Fung. Carp. 3: 190. 1865

Apothecia 2–10 mm in diam., sessile. Hymenium violet. Asci 90–120 × 8–10 μ. Ascospores 10–15 × 3–5 μ, colourless, 1- or 2-celled, ellipsoidal, often somewhat curved. Paraphyses colourless, filiform.

The apothecial form is often accompanied by fructifications characterised by basidium-like cells with three to five sterigmata which bear colourless spores of 4 × 1 μ. This stage of the fungus has already been described by Von Höhnel (1902) as *Pirobasidium sarcoides* (Jacq.) v. Höhn.

Coryne sarcoides has recently been reported from Canada as associated with fungi causing heart rot in coniferous as well as deciduous woods (Etheridge, 1954, and Etheridge & Carmichael, 1955).

On dead branches of *Pinus sylvestris*, also occurring on dead branches of deciduous trees, particularly *Fagus*.

4. CRUMENULA PINICOLA (Fr.) Karst. *in* Bidr. Känn. Finl. Nat. Folk 210. 1871

Apothecia 1.5–2 mm in diam., stipitate, red-brown, hairy. Hymenium beige. Asci 75 × 9–11 μ. Ascospores 17–30 × 3.5–4.5 μ, colourless, 1- or 2-celled, ellipsoidal, acuminate. Paraphyses colourless, filiform. Hairs red-brown.

On dying, thick branches and trunks of *Pinus* spp.

5. CRUMENULA SORORIA Karst. *in* Bidr. Känn. Finl. Nat. Folk 211. 1871

Apothecia 1–2.5 mm in diam., stipitate, black, hairy. Hymenium yellow-green. Asci 86–114 × 11 μ. Ascospores 13–30 × 5.5 μ, colourless, 1-, 2- or 4-celled. Paraphyses colourless, filiform. Hairs greenish brown.

The imperfect form, *Digitosporium piniphilum* Gremmen, is characterised by black pycnidia, containing colourless or faintly yellow, many-celled finger-formed pycnospores (Van Vloten & Gremmen, 1953).

Crumenula sororia is often found associated with canker-like wounds on the trunks of *Pinus* spp., but it may also occur as a saprophyte.

On thick, dead branches and trunks of *Pinus* spp.

6. DASYSCYPHUS CALYCIFORMIS (Willd.) Rehm *in* Rabenh., Krypt.-Fl., Zweite Aufl. 1 (3): 834. 1896

Apothecia 0.5–2.5 mm in diam., stipitate, orange, hairy. Asci 50–60 × 4–5 μ. Ascospores 5–7 × 2.5–3.5 μ, colourless, 1-celled, ellipsoidal. Paraphyses colourless, filiform. Hairs 70–90 × 3 μ, colourless, rough, septate.

The microconidial stage, often observed in nature, may also be obtained in vitro. The fructifications are yellow or orange-yellow, producing colourless, globose spores about 2 μ in diam.

On dead branches of *Pinus sylvestris*.

7. DASYSCYPHUS PULVERULENTUS (Lib.) Sacc., Syll. Fung. 8: 463. 1889

Apothecia about 1 mm in diam., with short stem, yellowish, hairy. Hymenium yellow. Asci 30–40 × 4 μ. Ascospores 4–5 × 1–2 μ, colourless, 1-celled, cylindrical-cla-

vate. Paraphyses colourless, mostly cylindrical, exceeding the asci. Hairs 30–70 × 3-4 μ, colourless or yellowish, rough, apices with irregular lumps of crystals.

Common, on dead needles of *Pinus* spp.

8. DESMAZIERELLA ACICOLA Lib. *in* Ann. Sci. nat. **17**: 83. 1829

Apothecia 3–6 mm in diam., sessile, hairy. Hymenium yellow-brown. Asci 200–250 × 12–14 μ. Ascospores 18–20 × 8–9 μ, colourless, 1-celled, ellipsoidal. Paraphyses brown, ramified, pointed. Hairs dark brown, 1–1.5 mm long.

The conidial stage belongs to the Hyphomycete genus *Verticicladium* Preuss and consists of dark brown conidiophores bearing colourless, globose or pear-shaped conidia, 3–3,5 μ in diam.

The connection between both stages has been proved in culture (Gremmen, 1949).

Fairly common, on decaying needles of *Pinus* spp.

9. GORGONICEPS ARIDULA Karst. *in* Bidr. Känn. Finl. Nat. Folk 185. 1871

Apothecia about 0.3 mm in diam., sessile or subsessile, brown or red-brown. Asci 100–135 × 11–12 μ. Ascospores 60–80 × 2–3 μ, colourless, many-celled, curved. Paraphyses colourless, filiform, apices somewhat thickened.

Conidial fructifications have been observed among some of the apothecia. Conidia about 45 μ long, colourless, 3-celled, club-shaped. Thusfar culture experiments failed to prove the relationship between conidial and apothecial stage.

On old cones and dead trunks of *Pinus* spp.

10. HYALOSCYPHA HYALINA (Pers. ex Fr.) Boud., Hist. Class. Discomyc. Eur. 127. 1907

Apothecia 0.2–0.3 mm in diam., sessile, white, hairy. Asci 40 × 4–6 μ. Ascospores 10.5 × 2 μ, colourless, 1-celled, ellipsoidal. Hairs 30–45 μ long, colourless, with a bulbous base, tapering to a fine point.

Fairly common, on old cones of *Pinus sylvestris*.

11. HYALOSCYPHA STEVENSONII (Berk. & Br.) Nannf. *in* Trans. Brit. myc. Soc. **20**: 206. 1936

Apothecia about 0.3 mm in diam., sessile, white, hairy. Asci 45–55 × 7.5 μ. Ascospores 13–15 × 3 μ, colourless, 1-celled, straight or somewhat curved. Hairs 20–30 μ long, colourless, tapering to a point.

On small, dead branches of *Pinus sylvestris*.

12. HYALOTRICHA TRICHODEA (Phill. & Plowr.) Dennis *in* Myc. Pap. **32**: 76. 1949

Apothecia 0.4–0.6 mm in diam., sessile, light brown, hairy. Asci 35–38 × 4 μ. Ascospores 6 × 2 μ, colourless, 1-celled, 2-guttulate, ellipsoidal. Paraphyses colourless, filiform, apices pointed. Hairs 100–140 × 4 μ, colourless or light brown, aseptate, tapering, flexuous, with narrow lumen.

On decaying, black-coloured needles of *Pinus sylvestris*.

13. LOPHODERMIUM PINASTRI (Schrad.) Chév., Flore gén. env. Paris **1**: 430. 1826

Apothecia 0.5–2.5 mm in diam., black, hysteroid. Hymenium cream or light brown. Asci 120–150 × 10–14 μ. Ascospores 100–125 × 1.5–2 μ, colourless, 1-celled, needle-shaped. Paraphyses colourless, filiform.

Leptostroma pinastri Desm., the microconidial stage which develops on the living needles, is characterised by small linear fructifications which form colourless, bacilliform spores measuring 6–8 × 1 μ.

This fungus is a parasite of the needles of various *Pinus* spp. The apothecia (hysterothecia) develop on the dead, fallen needles.

14. MELANOSPORA CHIONEA (Fr.) Corda, Icon. Fung. **1**: 24. 1837

Perithecia 0.2–0.4 mm in diam., black, globular, with long ostiola measuring 500–700 μ. Asci 35–45 × 14–18 μ. Ascospores 10–12 × 8 μ, brown.

Common, on very much decayed black needles of *Pinus sylvestris*.

15. OPHIONECTRIA SCOLECOSPORA Bref. & Tav., Unters. Gesammt. Myk. **10**: 178. 1891

Perithecia about 0.5 mm in diam., gregarious, red or orange-red, globular. Asci 100–120 × 5–11 μ, with primary and secondary ascospores. Primary ascospores 30–50 × 2.5–3.5 μ, colourless, many-celled (44–79 × 2.5–4 μ according to Brefeld). Secondary ascospores 3.5 × 1–1.3 μ, colourless, 1-celled, spermatoid, curved, a great many per ascus.

The pycnidial form, *Diplozythia scolecospora* Bubák, has orange-red, papillate, globular pycnidia. Pycnospores 2.5–3 × 1 μ, colourless, one-celled.

Common, on dead needles and small twigs of *Pinus* spp.

16. PEZICULA LIVIDA (Berk. & Br.) Rehm *in* **26** Ber. Nat. Ver. Augsb. 112. 1881

Apothecia 0.5–2 mm in diam., sessile, orange or yellowish brown. Asci 77–103 × 15–18 μ. Ascospores 22–34 × 6–7 μ, colourless, 1-, 2- or 4-celled, ellipsoidal or somewhat curved. Paraphyses yellowish, filiform.

Cryptosporiopsis abietina (Rostr.) Petr. is the conidial stage, forming acervuli with cylindrical conidia which are 20–40 × 8–12 μ, colourless, 1–4-celled.

A microconidial form also associated with this fungus has minute, colourless, bacilliform spores.

A number of other coniferous hosts is inhabited by this fungus (Gregor. 1931).

Common, on dead branches and trunks of *Pinus* spp.

17. PEZIZELLA CHIONEA (Fr.) Dennis *in* Myc. Pap. **62**: 53. 1956

Apothecia up to 1 mm in diam., sessile, yellowish or reddish yellow. Asci 50–60 × 4–5 μ. Ascospores 6–8 × 1.5 μ, colourless, 1-celled, ellipsoidal-cylindrical, straight or slightly curved. Paraphyses colourless, cylindrical.

On old cones of *Pinus sylvestris*.

18. PHACIDIUM LACERUM Fr., Obs. myc. **2**: 313. 1818

Apothecia 0.3–0.6 mm in diam., developing subepidermally. Hymenium after rupturing of the epidermis chocolate coloured or brownish. Asci 73–85 × 7.5–8.5 μ. Ascospores 9–11.5 × 4 μ, colourless, 1-celled, ovate. Paraphyses colourless, filiform.

By means of ascospores this fungus was cultured. Growth of the mycelium was fairly good, starting as a delicate, white mycelium which after ageing gradually changed colour into green-brown. After about one month an abundance of black pycnidia were formed, oozing cream or milky coloured sporehorns. The pycnospores were (11.5) 13.5–15.5 × 3–3.5 μ, one-celled, colourless, somewhat bacilliform.

It seems almost certain that this stage is identical with Von Höhnel's fungus *Ceuthospora pinastri* (Fr.) v. Höhn. [*in* Mitt. Bot. Inst. Techn. Hoch. Wien **2** (4): 99–109. 1925]. According to Von Höhnel, *Ceuthospora pinastri* is identical with *Dothiorella pinastri* (Fr.) Sacc. and *Fusicoccum pinastri* (Fr.) Karst.

On dead needles of *Pinus sylvestris*.

19. PHIALEA ACUUM (A. & S.) Rehm *in* Rabenh., Krypt.-Fl., Zweite Aufl. **1** (3): 717. 1896

Apothecia 0.1–0.2 mm in diam., shortly stipitate, white, hairy. Hymenium white or cream. Asci 27–35 × 4 μ. Ascospores 4–5 × 2 μ, colourless, 1-celled, ovate. Paraphyses colourless, filiform. Hairs colourless, 15–30 μ long, club-shaped, finely punctate.

Beside the apothecial stage it was possible in vitro to obtain pycnidia, the pycnospores of which were 7–8 × 4 μ, colourless, 1-celled. This pycnidial stage seems to be connected with the apothecia and may be identical with the fungus *Phoma mediella* Karst.

Common, on dead very wet needles of *Pinus* spp.

20. SCLEROPHOMA PITYOPHILA (Corda) v. Höhn. *in* Sitzber. Akad. Wiss. Wien **118**: 1234. 1909

Pycnidia 0.3–0.5 mm in diam., with dark brown pseudoparenchymatous cell-walls. Pycnospores 5–7 × 2–3.5 μ, colourless, 1-celled, ovate.

Recently, Jahnel & Junghans (1957) mentioned *Sclerophoma pityophila* as a parasite of pine needles, although they failed to give definite proof of its parasitism: "Ob bei dem Kiefernaltholzsterben der Pilz die primäre Ursache oder eine sekundäre Folgeerscheinung ist, können wir nicht entscheiden." and "Nach unseren geringen Infektionserfolgen an gesunden Pflanzen müszte man annehmen, dasz normale Nadeln nicht infiziert werden können."

A very common fungus on dead needles of *Pinus* spp.

21. TYMPANIS HYPOPODIA Nyl., Obs. Pez. Fenn. 72. 1868

Apothecia 0.5–1 mm in diam., sessile, black, cartilagineous. Asci 70–90 (110) × 9–12 μ, with primary and secondary ascospores. Primary ascospores 6–10 × 2–4 μ colourless 1- or 2-celled, fusiform. Secondary ascospores 2–3 × 1 μ, colourless, cylindrical or allantoid. Paraphyses colourless, filiform, forming a brownish epithecium.

The conidial stage, *Pleurophomella* sp., is characterised by black, globular or pear-shaped pycnidia, 0.1–0.3 mm in diam., containing pycnospores which are

2–4 × 1 μ, colourless, 1-celled, cylindrical or allantoid, formed on filiform conidiophores.

The connection between both stages has been proved in culture by Groves (1952).

On thick, dead branches of *Pinus sylvestris*.

22. VALSA PINI (A. & S.) Fr., Summa Veg. Scand. 412. 1849

Perithecia very minute, gregarious in a stroma, black, with short ostiola. Asci 30–32 × 5–6 μ. Ascospores 6–9 × 1.3 μ, colourless, 1-celled, allantoid.

The imperfect stage, *Cytospora* sp., has pycnidia with 4–5 × 1 μ, colourless, 1-celled, allantoid pycnospores.

On dead branches of *Pinus sylvestris*, very common.

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